



**CALIFORNIA
VOLUNTEERS**
Office of the Governor

TRIBUTARY TRIBUNE

Stories and Art by Members of the California Conservation Corps
Watershed Stewards Program, in partnership with AmeriCorps

Year 26, District D

Wetlands are the Way!

By: Maya Vavra, Placed at Central Coast Wetlands Group (CCWG) in Moss Landing

As a WSP Member with CCWG, my appreciation for wetlands grows every day. I am fortunate to work on the treatment wetland that inspired this painting, a biodiverse ecosystem engineered by CCWG and partner agencies. Through collaboration with local farmers, CCWG transformed this previously unusable farmland into rich habitat.

This constructed wetland has flourished and now provides essential ecosystem services. Water runoff from the surrounding farmland has a high concentration of nitrates, which foster the growth of algal blooms. Algal blooms eventually deprive the water of oxygen and cause harm to fish and wildlife. The treatment wetland helps to mitigate this problem by slowing the flow of runoff and reducing nitrogen content in the water. As runoff slows, the polluted sediment settles in the wetland and does not reach the Monterey Bay as quickly. The



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A program of the California Conservation Corps, WSP is one of the most productive programs for future employment in natural resources.

WSP is administered by California Volunteers and sponsored by the Corporation for National and Community Service.

Watershed Stewards Program—Tributary Tribune

The Ghost of Nature

By: Maret Smith-Miller, Placed at California Department of Fish and Wildlife (CDFW) Big Sur

When I was placed with the CDFW – Big Sur, I was grateful for the opportunity to explore the infamous Big Sur Coast. When sharing this news with friends and family, I was told I must spill all the secret spots I learn. Once in Big Sur, I learned about its recent outdoor recreation explosion. At the five official Big Sur State Park campgrounds, campers often have to reserve a campsite up to six months in advance. Ironically, many people visit Big Sur to escape the industrial landscape they live in, but now with an influx in tourism, it seems to me the experience they are seeking is getting more difficult to find. Big Sur’s growth in popularity has pushed outdoor enthusiasts to escape the crowds and campsite costs by finding their own secret, secluded spots in hopes to experience Big Sur authentically. In the outdoor recreation communities I have been a part of, the quality of the experience has been measured in how far removed it appears from human impact. The romanticizing of the separation between humans and nature has built a problematic framework for recreation.

Just as outdoor recreation thrives on distance from human infrastructure and activity, conservation tends to assume that more exposure to humans inhibits the likelihood of successful rehabilitation. In my first week with CDFW, we had the opportunity to visit an Albino Redwood sprouting from the base of the beloved California Redwood, *Sequoia sempervirens*.¹ I was captivated by their white needles caused by a genetic mutation where the Redwood cannot produce chlorophyll².

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An Albino Redwood Tree Up Close
(Credit: Sienna Streamfellow)

Wetlands, continued from page 1.

wetland habitat is rich in microorganisms that can metabolize nitrates and remove them from the settled water. In addition, wetland plants help to further filter the runoff by absorbing additional nutrients such as nitrogen and phosphorus.

Because of this treatment wetland, the agricultural runoff flowing into the Monterey Bay is far cleaner. Additionally, the wetland provides excellent habitat for wetland birds like the Great Blue Heron, amphibians like the threatened California Red-legged Frog, and native plants like California Bulrush. Here’s to supporting our local wetlands!

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Members Maya Vavra and Alex Johanson work on clearing the bioreactor to help the wetland thrive. (Credit: Sienna Streamfellow)



Wildfire in Shaver Lake, CA
(Credit: Sienna Streamfellow)

Smokey Bear Did Us Dirty: Reconsidering Wildfire

By: Lizz Marks, Placed at California Department of Fish and Wildlife Big Sur

Over the past several years, major wildfires have been a severe and devastating reality for many communities across California and the West. The gravity of this was clear from the first week of my WSP term, which was punctuated by power outages across California, a new and drastic measure to reduce fire dangers. While climate change is certainly part of the explanation for increasing wildfires, a decades-long history of fire suppression also played a significant role.

In the late 19th and early 20th century, the United States began designating national parks and protecting forests. Around the same time, a few large and notable wildfires occurred, threatening the economically valuable and now protected timber. In response, the newly established U.S. Forest Service initiated aggressive policies to both prevent and suppress wildfires. It wasn't until the 1970s that the agency began responding, however slowly, to the emerging evidence that fires play an important role in forest ecosystems. Not only have many trees and plants evolved to withstand fires, such as ponderosa pine's (*pinus ponderosa*) thick, fire-retardant bark and ability to self-prune its lower branches, inhibiting fires from climbing to the crown, but some species even depend on fire. For example, the giant sequoia (*sequoiadendron giganteum*) is one of many tree species that produces serotinous cones. These types of cones are sealed shut with a thick resin, requiring the intense heat of a fire to open and disperse their seeds. Other species, such as

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"Unlike large scale dam removal projects, the removal of smaller barriers is far less expensive, and take significantly shorter time to assess, plan, permit, and complete."

- Kevin Nolan

No Money, More Problems

By: Kevin Nolan, Placed at Santa Barbara Steelhead Co-Op

Despite ongoing recovery efforts for salmonids throughout California, habitat loss has remained a major obstacle to its success. This can largely be attributed to the thousands of artificial barriers in our streams, which have inhibited the once prolific historical range of these fish.

As a result, most public media attention has focused on the removal of some of these barriers, particularly large-scale dams. Although this awareness is beneficial, the reality is most dam removal projects require a substantial amount of funding and sometimes take decades before they are completed. Matilija Dam in Ventura County is a perfect example of this issue. There has been an ongoing effort to remove it for nearly 20 years, yet it still has not been finalized. The total cost of removing the Matilija Dam, and the required downstream mitigation components such as two bridge removals, two levee reconstructions, and a diversion

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About the Watershed Stewards Program

Since 1994, the Watershed Stewards Program (WSP) has been engaged in comprehensive, community-based, watershed restoration and education throughout coastal California.

WSP was created in 1994 by California Department of Fish and Wildlife (CDFW) biologists, educators, and the California Conservation Corps to fill critical gaps in scientific data collection, in-stream restoration, and watershed education. In collaboration with landowners, tribal communities, teachers, community members,, nonprofit organizations, and government agencies, WSP works to revitalize watersheds that contain endangered and threatened salmonid species (Chinook Salmon, Coho Salmon, and Steelhead Trout) by using state-of-the-art data collection and watershed restoration techniques. WSP also engages members in education, outreach, and volunteer recruitment efforts to increase the capacity of partner organizations. WSP currently has Members working from the Oregon border to the Santa Monica Mountains.

Smokey Bear Did Us Dirty, continued from page 3.

California coffeeberry (*frangula californica*), produce seeds with a thick coating that can lay dormant for years until fire triggers their germination. We have plenty of evidence that many indigenous groups used fire to clear and manage land sustainably for thousands of years, evolving a mutually beneficial relationship. Yet, decades of unnatural fire suppression over the past century have left our forests so overgrown that now when fires do break out, they burn much bigger and more intensely. This has made them far more destructive, often consuming even those species which have adapted to coexist with wildfire.

Forest management agencies have since transitioned from policies of fire suppression to those of prescribed burns and fuel load management. However, it has become increasingly difficult to allow wildfires to burn naturally due to the encroachment of development and exurban sprawl into our wildlands. If you drive through some of these areas, it's impossible not to notice the ubiquitous billboards reminding residents to create defensible spaces around their homes. Perhaps, however, coexisting with fire is teaching us some important lessons about humility and caution in our attempts to manipulate the environment for our own interests. It also reminds us that the fate of the environment is our fate too. I think it's unrealistic and unhealthy to believe we can return any landscape to a fabled state of "nature," as we always have and always will depend on natural resources. But if we can start to weigh the needs of the plants and the salmon and the soil, and all others as equal to our own, maybe we can remember what it feels like to be a sustaining member of a healthy, balanced ecosystem.

References

1. Habeck, R. J. "Sequoiadendron giganteu." Fire Effects Information System (1992) <https://bit.ly/30OSP2C>
2. Lake, F. K., Wright, V., Morgan, P., McFadden, M., McWethy D., Stevens-Rumann, C. "Returning Fire to the Land: Celebrating Traditional Knowledge and Fire." *Journal of Forestry* 115, no. 5 (2017).
3. Mullen, L. "How Trees Survive and Thrive After A Fire." *Your National Forests Magazine* (2017) <https://bit.ly/38G3Oyj>.
4. "U.S. Forest Service Fire Suppression." *Forest History Society*. <https://bit.ly/36nAgDS>



Salmon of the World by Leanne Pearl



Matilija Dam (Credit: Anthony Plascencia of Ventura County Star)

To my surprise, there are approximately 400 Albino Redwoods

The Ghost of Nature, continued from page 2.

from the southwest corner of Oregon to southern Monterey County². However the locations of most Albino Redwoods go unpublicized to protect them from harm. Yet, ironically, research has shown that there are higher proportions of established Albino Redwoods in areas with increased human activity². It seems to me that this conservation method is the most conventional, however I am beginning to question its effectiveness.

Just as Albino Redwoods were once considered parasites and then found to have a symbiotic relationship with California Redwoods, we should continue to explore the dominate discourse between nature and humans in the United States³. A cultural understanding I grew up with was that nature is healthiest when there are no human influences and, conversely, nature's pristineness and pureness fades when contaminated with human activity. Throughout my education I have realized this creates a dichotomous system that perpetuates the gap between humans and nature, which is unsustainable. This instills a self-perpetuating challenge that humans can only interact with nature in a harmful manner so we only protect and value the spaces where humans are not. Understanding our connectedness will help form a more holistic outdoor recreation and conservation practices. All spaces should be protected and respected regardless of human activity and human value because they have intrinsic value.

References

1. "Coast Redwood (*Sequoia sempervirens*)" University of California Forest Research and Outreach. <https://bit.ly/2RmJb4c> Accessed 10 Dec. 2019
2. "Welcome to Chimera Redwoods" Chimera Redwoods. <https://www.chimeraredwoods.com/>. Accessed 10 Dec. 2019
3. "The mystery of the 'ghost trees' may be solved" The Eagle. <https://bit.ly/2GkegiD> Accessed 10 Dec. 2019

No Money, continued from page 2.

modification is close to \$111 million between planning and completion¹. With such a large amount of money required for this project, it's hard not to imagine how the money could better be used to restore critical habitat for salmonid in a timelier manner.

There are neglected barriers in our streams that pose a direct threat to the survival of salmonids. Smaller scale barriers like road culverts, bridges, grade controls, diversions, and concrete channels have gained less attention in the ongoing effort for habitat restoration and fish passage. These smaller barriers are just as important for removal as are dams. Unlike large scale dam removal projects, the removal of smaller barriers is far less expensive, and take significantly shorter time to assess, plan, permit, and complete. According to the California Department of Fish and Wildlife Passage Assessment Database (PAD); an online public database, there are 114 known small-scale artificial barriers to fish passage in Santa Barbara and Ventura County alone². It's hard not to speculate how \$111 million for the Matilija Dam removal could alternatively fund dozens of small barrier removals within the same geographic region. This could potentially restore even more mileage of important salmonid habitat than a single dam removal itself.

References:

- ¹ Matilija Dam Removal and Ecosystem Restoration Project Funding Plan. (April 2017). Matilija Funding Subcommittee. http://matilija-coalition.org/dev/wp-content/uploads/2016/01/Matilija-Funding-Plan_FINAL.pdf
- ² California Passage Assessment Database (PAD). (2019). California Department of Fish and Wildlife. Available: <https://nrm.dfg.ca.gov/PAD/>.

The Rerouting of Prefumo Creek

By: Melanie McMillan, Placed at San Luis Obispo Steelhead Initiative

Laguna Lake Recreation Area (LLRA) is a place of great value to the residents of San Luis Obispo (SLO) because of its beauty, blossoming biodiversity, and variety of recreational opportunities on and around the lake. LLRA accommodates multiple habitat types such as wetland, riparian, ridgeline, and grassland. It supports endangered species such as steelhead and Chorro Creek bog thistle, sensitive species such as the southwestern pond turtle and adobe sanicle (a flowering plant), and an abundance of rare and beautiful wildflowers. Although lake filling is a natural process, human alterations have increased the rate of sedimentation in the lake creating community concern.

Major alteration of this historically natural lake began in the 1960's aimed towards current and potential development. Prefumo Creek was rerouted into the lake and new sections were excavated in various locations to expand the lake. Originally, the water that flowed out of the lake was joined by Prefumo creek which later combined with Froom Creek (figure 1). From there, Froom Creek flowed into the main stem, SLO Creek, which discharges into the ocean at Avila. Today, Prefumo Creek flows into the lake and a new outlet was created which connects directly to SLO creek (figure 2). Disconnecting Prefumo and Froom creek, in conjunction with changing the lake inlet and outlet hydrological connections, greatly altered the energy dissipation of the

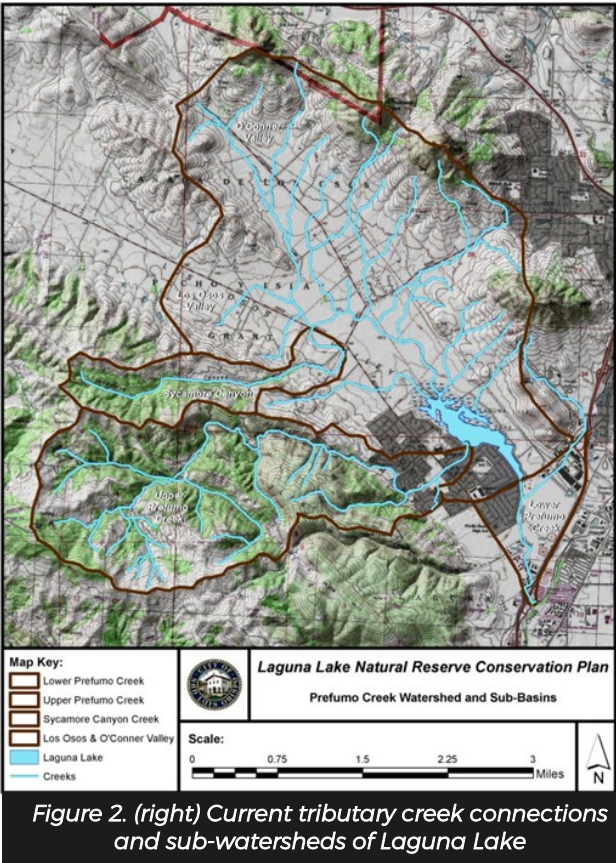


Figure 2. (right) Current tributary creek connections and sub-watersheds of Laguna Lake

Prefumo Creek sub-watershed. This altered energy impacts hydrological function effecting water availability and quality, soil health which alters plants and microbe communities, and wildlife services which provide environmental stability. Of more immediate consequence, the alterations have increased the rate of sedimentation in the lake creating shallow warm water. This creates a new habitat which is more challenging for the threatened native steelhead but more tailored towards invasive species, excessive algae, and harmful bacteria which pose potential human health hazards.

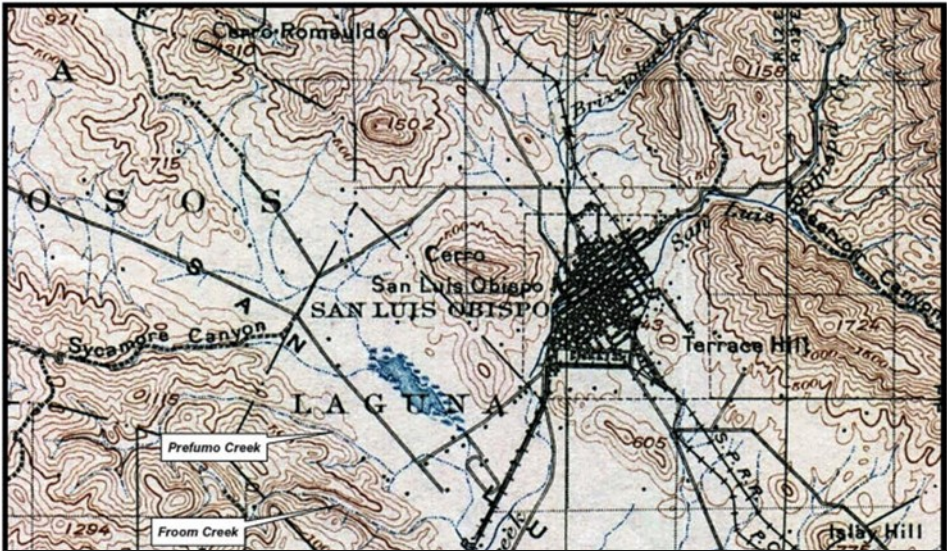


Figure 1. (above) Historical tributary creek connections to Laguna Lake

Thankfully, the city of SLO has taken initiative on mitigating these impacts with a dredging plan to take place starting in 2020. At SLO Steelhead Initiative we will be working on a study plan and collecting data for the projects to satisfy permits and ensure resiliency of LLRA. Removing sediment from the lake is a step towards protecting this ecosystem. Although if we want to restore a sustainable system to the community, it is our duty to consider the health and function of the watershed as a whole and make room for our waterways.



*WSP Region II Members help out at the Chorro Creek Ecological Reserve during Regional Training
(Credit: Greg Poulton)*

The Good Dirt on Soil

By: Hayley Barnes, Serving at the Upper Salinas-Las Tablas Resource Conservation District (USLT RCD)

Healthy soils are the building blocks of healthy watersheds. Soil is very much alive with its own complex ecosystem. When healthy, soil functions as a living ecosystem that cycles nutrients and water effectively and supports the plants and animals in it and above. Healthy soil is also porous, meaning there is space between soil particles. These spaces increase the soil's ability to absorb and hold water, lowering the risk of flooding. This is imperative for healthy watersheds because greater water holding capacity reduces runoff. Although runoff is a natural and healthy process, excessive runoff can increase normal rates of erosion, delivering more sediment into streams and rivers. Unhealthy soils are often compacted, lacking pore space, and therefore prone to excessive erosion. Watersheds with unhealthy soils are more susceptible to destructive flooding events and sedimentation, negatively impacting salmonids by reducing spawning habitat and water quality.

Supporting the soil ecosystem is crucial to improving soil health. When soil communities are thriving, carbon and nitrogen cycle from the air to the soil and back. Adding

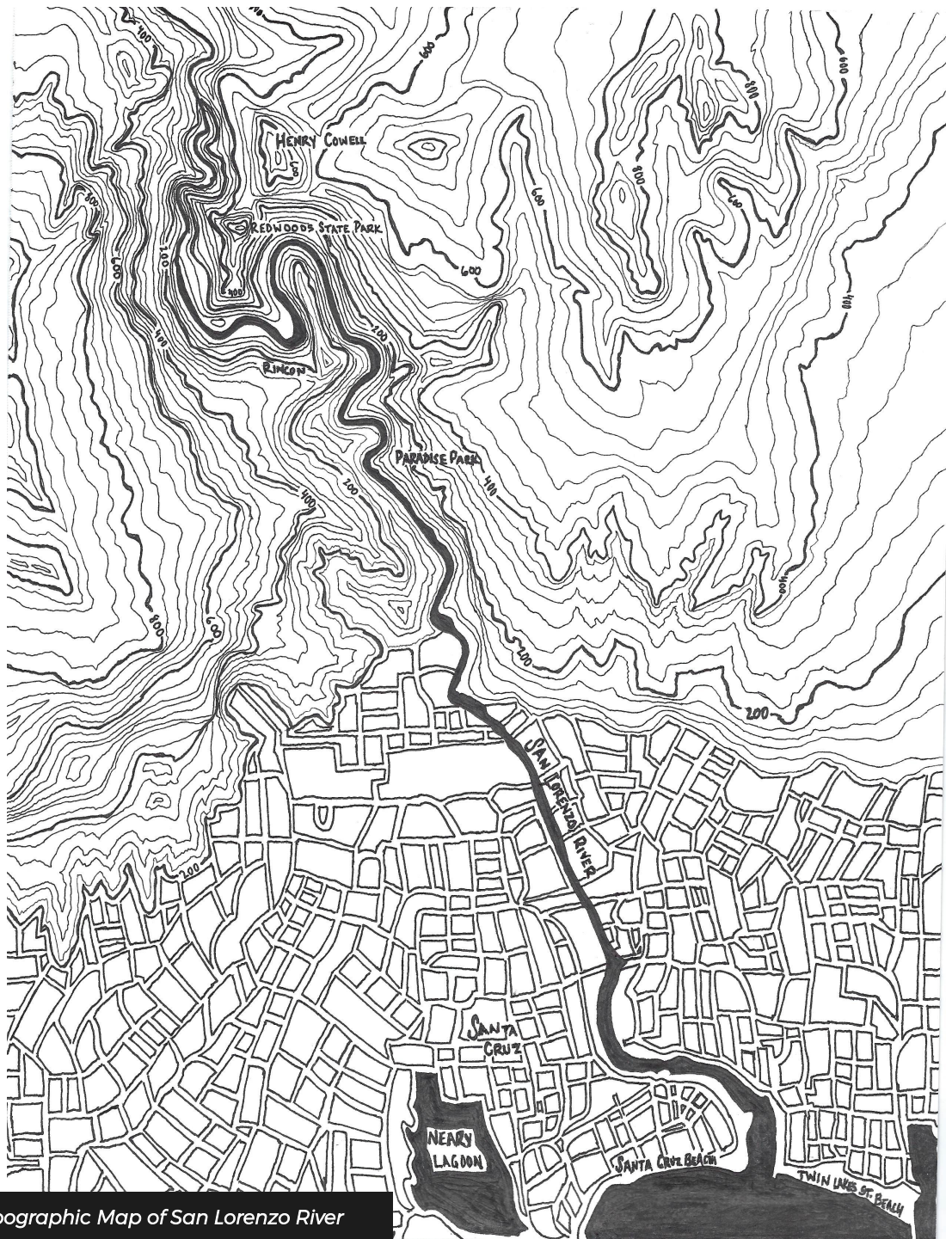
organic material, like mulch, compost, and plants, is one of the simplest ways to improve soil quality because it provides nitrogen and carbon to feed soil organisms. Microbes, roots, arthropods, and earthworms create pore space and structure as they carry out their life cycle within the soil. For example, as bacteria travel they pick up tiny particles leaving space behind them. Thriving soil ecosystems have an abundance of diverse soil organisms creating pore space and cycling nutrients.

Unhealthy soils are often the result of bare soil. When soil is left bare, with no cover or plants, it halts the carbon cycle, significantly reducing the number of soil organisms. This is problematic for watershed health because the lack of soil organisms reduces the porosity of soil which decreases the water holding capacity. Additionally, unhealthy barren soil cannot support important microbes like nitrogen-fixing bacteria that help plants absorb nitrogen, and fungi that bring nutrients to the plants in exchange for carbon and energy. This reduces the porosity and fertility of the soil and the overall health of the watershed. Soil is the cornerstone to healthy ecosystems and watersheds. By supporting soil ecosystems through sustainable soil management practices, we can begin to heal our soils and watersheds.

The Mighty San Lorenzo

By: Alex Johanson, placed at the Central Coast Wetlands Group (CCWG), the Santa Cruz Resource Conservation District (RCD), and the County of Santa Cruz, Environmental Health Division

I wanted to create something that was relevant to all three of the organizations at my Placement Site that also incorporates one of my personal goals for this year. One of my personal goals is to draw more often and with a more technical focus, so I decided to free-hand a topographic map of the lower San Lorenzo River. While serving with the County and the RCD, my focus has been on various watersheds of Santa Cruz that have been impacted by residential development. One of the most important rivers that we've spent time in is the San Lorenzo River. My Site Partner, Maya Vavra and I conduct multiple different surveys looking at various markers of watershed health, including the presence/absence of large wood in major rivers and their tributaries, the total number of active and inactive diversions in residential areas and their effects on summertime low flows, and the impact and role of groundwater exchange on surface water availability. We have also completed riparian assessments using the Riparian Rapid Assessment Method (RipRAM), which is a standardized tool for riparian habitats statewide that looks at the general integrity of these waterways through the lens of ecologic health and restoration potential. CCWG pioneered this technique as a way to standardize data collection and assessment for all wetland systems (CRAM, or California Rapid Assessment of Wetlands), with RipRAM specifically focusing on riparian wetlands. The data we collect for the watersheds in Santa Cruz is being used to help measure the effectiveness of restoration projects as a pre- and post-restoration monitoring tool. The San Lorenzo is proposed as one of the rivers that can assist with the county's recovery goals for Coho Salmon, and will also be a focus of one of the tours at Salmonid Restoration Federation (SRF) in 2019. Maya and I will also be presenting a poster at SRF that provides a five-year update on the status and land-use change along the San Lorenzo River.



Alex Johanson Hand Drawn Topographic Map of San Lorenzo River



A picture of Marre Weir with Denil Fish Ladder (top left) (Credit: Grace Willett)

Let's Get Weir'd

By: Grace Willett, Placed at San Luis Obispo Steelhead Initiative

Movement is an integral, inescapable component of the Steelhead Trout (*Oncorhynchus mykiss*) life cycle. Living out several years of its life in the ocean food web and moving upstream in San Luis Obispo (SLO) Creek to spawn is not a negotiable choice for the success of the species. Located in the unincorporated town of Avila Beach, is where the mouth of SLO Creek meets the ocean. Just upstream of the mouth, the Marre Dam (pictured above) is a sheet pile dam embedded 65 feet into the bedrock and rises four and a half feet from the creekbed. The dam's installation took place in December of 1969 to prevent tidal influences and salt water intrusion affecting the well-water resources of the Avila Valley Residents. The installation of the dam marked the beginning of the next 50 years of disagreement between property owners and fish biologists pertaining to the use of the watershed. Upgrades were made to the dam, including a Denil Fishway (a type of fish ladder) and a tidal/low-flow notch, in response and gave the dam its new name, the Marre Weir. These upgrades are limited in their capabilities to serve fish passage across different species and fish sizes, low flow creek conditions, and during low tide ocean events. Many fish biologists consider the weir to be a "keystone fish barrier" within

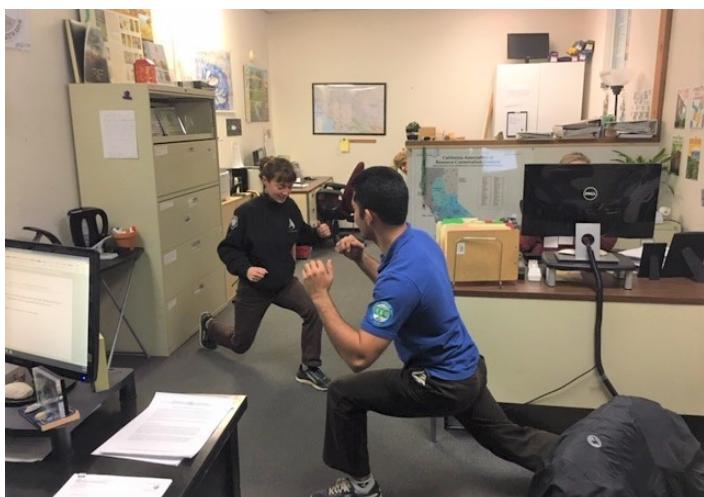
the watershed because it is at the lowest point in the watershed, preventing incoming steelhead from accessing prime spawning habitat. Other impacts as a result of this dam include loss of estuarine habitat, debris jams on the weir, and inhibition of natural hydrological function. The results of these impacts may have given rise to the observed increased number of invasive species, degradation to water quality, and higher water temperatures near the weir.

Even while the removal of the Marre Weir is the biologically preferred alternative, this action conflicts with the case of the water users, and also remains a more costly option in both permitting and the physical removal. Unfortunately however, steelhead trout do not negotiate, since these anadromous fish species depend on migrating upstream to complete their life cycle and spawn. Even with conflicting suggestions for the dam's use, there are design plans for a new fish passage structure on the way. The controversial history regarding the Marre Weir begs for a progressive approach to its chronic impacts on the San Luis Obispo Creek Watershed.

References:

Leggett, D. 1994. Marre Dam study for fish passage improvement. Unpublished undergraduate thesis. Biological Sciences Department, California Polytechnic State University, San Luis Obispo.

Upper Salinas-Las Tablas Resources Conservation District 2001. San Luis Obispo Creek Marre Dam: An Evaluation of the Existing and Future Conditions Findings and Recommendations. Upper Salinas-Las Tablas Resource Conservation District. December 3, 2001.



Oswaldo and his site partner, Hayley Barnes, doing lunges.
(Credit: Devin Best)



Oswaldo and his Mentor, Devin Best, doing push ups.
(Credit: Hayley Barnes)

Anime: Lessons and Parallels to WSP

By: Oswaldo Martinez, Placed at Upper Salinas—Las Tablas Resource Conservation District

Anime, a wildly popular form of Japanese animation, boasts dozens of endearing super heroes whose reach extends far beyond the limits of the screen. Their influence transcends various media forms, such as rap, TV shows, social media, YouTube, and even Ultimate Fighting Championship (UFC) matches, where one might catch a quick shout-out to such heroes as Naruto or Goku. Like millions of fans worldwide, I admire the modern myths surrounding these characters because they represent flawed individuals seeking to evolve into the greatest version of themselves, which often translates to a gargantuan amount of physical and mental training. To me, they offer principles to live by every day. Indulge me if you will.

The Dragon Ball animated series, for instance, is one of the most iconic and longest-running animes. The protagonist Goku is famous for his childish humor, his obsession with becoming mentally and physically stronger, and his bright gold aura as he powers up before a fight. He keeps his spirits up in spite of the daily torturous training sessions with his friends, or the endless foes who wreak havoc on the planet. Arguably, he grows into the most powerful fighter in the universe, yet his desire to improve never quenches. Like many other anime protagonists, Goku demonstrates self-discipline and positivity in the face of Herculean adversity. I'd like to think that I apply these principles to

life as a Watershed Stewards Program Member.

Serving at the Upper Salinas-Las Tablas Resource Conservation District is heroic work too. Our modest team of six navigates the world of permitting, grants, mapping, outreach, education, workshops, agriculture, and watershed management. The adversity comes in the form of deadlines that loom around the corner, or field conditions that tax our joints. We persevere through blistering 90-degree heat and merciless sun in shadeless vineyards, travel long distances to revegetate humble patches of barren land, and trudge through creeks while fighting back lumbar or knee pains. To prepare for these trials, we follow a rigorous regimen of safety, dietary restrictions (1 donut/week), and physical training, and we maintain our spirits bright with a rich sense of humor. In short, staying self-disciplined and positive is imperative to the job, but more importantly, WSP service offers us an opportunity to evolve into a greater version of ourselves. I think Goku would be proud.



Created by: Oswaldo Martinez

The Story of Crayfish

By: Rachel Kieffer, Placed at Recreational Conservation District in Santa Monica Mountains (RCDSMM)

Red swamp crayfish (*Procambarus clarkii*) are found throughout Topanga and Malibu Creeks. Resembling a miniature lobster, the crayfish are native to northern Mexico and southeastern US. The crayfish have become a pesky invasive species within our creeks. Crayfish were introduced into Topanga Creek in 2001 as fish bait, and with no natural predators they have thrived. They are also pervasive in Malibu Creek, with over 11,000 spotted in June of 2015. Since 2015, there has been a decrease in the number observed after an extremely rainy season, referred to as the Great Flush of 2017. However, more recently Topanga has seen a spike in crayfish, specifically baby crayfish (Dagit et al. 2019).

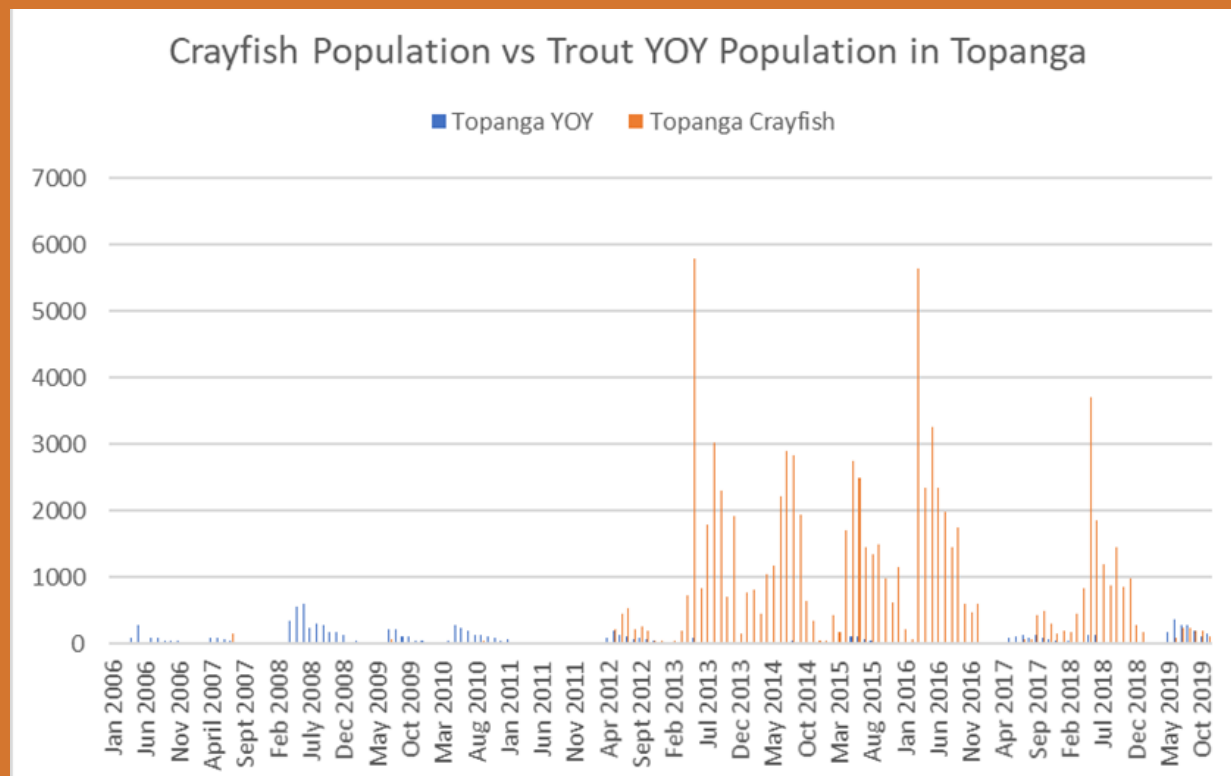
Crayfish are not only a problem because they can outcompete native species for resources, but they also eat several of the native species. They have been known to eat newts, macroinvertebrates, young of year trout (YOY), as well as eggs of several species (Garcia et al. 2017 and Dagit et al. 2019). There have been unsuccessful efforts to completely eradicate crayfish due to their fast rate of reproduction and the difficulty to access parts of the creek. Crayfish can reproduce at least twice a year, with a healthy female reproducing up to 600 viable offspring at one time (Garcia et al. 2017).

Some of the RCDSMM's education programs in Topanga Creek include crayfish removal in which children and adults, armed with dip nets and hot dogs tied on strings, remove as many crayfish as they can. Volunteer crayfish removal days also occur at least twice a year when funding is available. The crayfish caught are either taken for class use or frozen and fed to animals at a wildlife rehabilitation center. Efforts to remove the crayfish from the local creeks will continue in order to protect our local native species.

References

Dagit, R., D. Alvarez, A. Della Bella, etc., 2019. Steelhead abundance monitoring in the Santa Monica Bay, January 2017 – November 2019. Prepared for California Department of Fish and Wildlife Contract No. 1650904. Prepared by the Resource Conservation District of the Santa Monica Mountains, Topanga, CA.

Garcia, C., E. Montgomery, J. Krug, and R. Dagit., 2015. Removal efforts and ecosystem effects of invasive red swamp crayfish (*Procambarus clarkii*) in Topanga Creek, California. Bulletin of the Southern California Academy of Sciences. Vol 114(1):12-21.



Crayfish Population chart (Credit: Resource Conservation District of the Santa Monica Mountains)

Upper Matilija Creek 2018 immediately post fire and debris flow. (Credit: CDFW Santa Barbara)



Regrowth of vegetation on the hillside surrounding North Fork Matilija Creek January 2020 (Credit: Taylor Pantiga)

Importance of Fire Adaptations in Santa Barbara Plants

By: Taylor Pantiga, Placed at Santa Barbara Steelhead Initiative Co-Op

In December 2017 and January 2018, the Thomas Fire burned over 280,000 acres in Santa Barbara and Ventura counties⁶. The debris flow following the fire wiped out many of the resident Rainbow Trout in the Ventura watershed. With fire being a natural part of California's ecosystems, some plants have developed unique adaptations that help them survive and regrow after a fire. The recovery of the native vegetation is imperative to provide suitable habitat for Rainbow Trout, because it improves water quality and provides habitat cover for them. So how do these plants survive fire?

The Coast Live Oak (*Quercus agrifolia*) and manzanitas have adaptations such as thick bark and the ability to re-sprout to help them recover after a fire. Even if damaged on their exterior, large oak trees can still have living tissue underneath. This allows the tree to remain alive after a fire incident and eventually sprout new vegetation from the branches or trunk⁵. Oak trees are also capable of sprouting from their root crown. This allows small oak trees that experience top-kill (the death of its tissues

above the soil) to sprout at the roots and continue to grow back into a healthy oak tree. Manzanita and oak species are similar in this way. Eastwood Manzanita (*Arctostaphylos glandulosa*) has a large, woody stem underground, called a lignotuber, which houses buds that can sprout after a fire⁴. Bigberry Manzanitas (*Arctostaphylos glauca*), are dependent on fire for their seeds to germinate². These adaptations are being seen in the Ventura watershed, which brings hope to the recovery of the native vegetation.

The remnants of plants left behind after the Thomas Fire appeared to be burnt sticks with no hope of life. Now, two years later, revegetation can be seen around the base of these burned plants. If the sprouting started within several months after the fire, the sprouts can be up to three feet tall at this point⁵. They can also have a foliage density that is 80-100% of pre-fire levels within 10 years⁵. The regrowth of these native plant species is important for Rainbow and Steelhead Trout. The plants help stabilize banks which in turn keeps more sediment out of the creek, allowing the water quality to remain clear. Their leaves provide shade, keeping water temperatures low, and cover for trout to hide under when the leaves fall¹. Hopefully, the regrowth of vegetation will lead to a suitable environment for the recovery of trout in the Ventura watershed.

References:

1. County of Ventura, Planning Division. Guide to Native and Invasive Streamside Plants. (2006). Retrieved from <https://bit.ly/2vixAdT>
2. Howard, Janet L. 1993. *Arctostaphylos glauca*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <https://bit.ly/30S4oX5> Accessed 21 November 2019.
3. Howard, Janet L. 1992. *Arctostaphylos glandulosa*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <https://www.fs.fed.us/database/feis/plants/shrub/arcgla/all.html> Accessed 21 November 2019.
4. James, S. 1984. Lignotubers and Burls: Their Structure, Function and Ecological Significance in Mediterranean Ecosystems. *Botanical Review*, 50(3). 225-266. JSTOR.
5. Steinberg, Peter D. 2002. *Quercus agrifolia*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <https://www.fs.fed.us/database/feis/plants/tree/queagr/all.html> Accessed 21 November 2019.
6. Thomas Fire. (2018). Retrieved from <https://inciweb.nwcg.gov/incident/5670/>

Alumni Spotlight: Alex Wong

Interviewed by: Leanne Pearl, Placed at San Luis Obispo

What is your title and responsibilities at your current job?

I am an Associate Professor of Physics at the College of San Mateo. I teach physics classes and non-physics class such as honors seminar, involving data projects of different sciences, and a class on drones and drone mapping. I also meet with multiple other teachers to develop new courses that will help the university run overall.

What do you like to look back on when reminiscing of WSP? Why?

A lot of different things. One of those is the community. WSP has an amazing community to be a part of, especially when coming from different parts of the country. It's a lot of Members spending time together, from different backgrounds, doing different things that are all connected. The 25-year reunion provided that same connection. Some of the Members are still my closest friends. That reunion was quite phenomenal. Secondly, I would say the work! You get to explore these fascinating and beautiful places, all while learning about natural resources and the way the ecosystems work with those resources.

What advice would you give current WSP Members to help them in their budding careers?

One of the things I could have done better was actively learning from all the different people I encounter at WSP's Placement Sites. I had so many opportunities to meet people, learn what they do, and where they are from. It's important as a WSP Member to actively pursue a broader understanding of those surrounding you. Listen to their perspectives and what they're doing. Try to not stay so narrowly focused on your tasks but actively learn!

How did WSP help you in your career path?

Well, it was pretty non-linear. After WSP, I got into a consulting firm up in Berkley to help with water quality testing which was in line with my work alongside the Yurok Tribe. WSP definitely helped prepare me for that job. I had general knowledge about water quality and natural resources because of WSP. Currently, I'm not in a field directly related to WSP. I think my time working

outside of academia is super valuable. Having "real world perspective" is valuable for me. Having spent time doing more applied sciences helps me advise my students and bring real world experiences into the classroom. My research program for drone mapping has allowed me to get better aerial footage of restoration projects.

What was it like working with the Yurok Tribe?

It was pretty amazing and a small community. It was definitely different from anywhere I've experienced (being from New Hampshire and moving to the Bay Area). The Reservation had unique culture and history involved. It was a window into their culture, which I found fascinating. I did feel like an outsider coming into the community, which was difficult given the complicated history. The Mentors really helped us find our footing in our specific role out there. The environment I worked in made it feel like my job and the things I was researching really mattered. The data we collected and resources we worked with were so direct! It had an immediate impact which was impressive. I felt [the Yurok Tribe Site] was a really strong site because the responsibilities we had made prevalent impacts.

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Alex Wong standing next to a 'water barometer' him and his team made.

Watershed Word Search

N G P Y Q O S P A W N I N G M U G F L H
 M U O A G R I C U L T U R E M U S R Y P
 M S O H G M H I C J E T E Z U D Y F U Z
 C U D E T K K K N C E N T K L G R J U P
 F O A A L W X T A C U E A D B I W M P U
 Y M E L S I B S I V D M W O Q W G N D N
 F O H T J T Y C R K H E D W R G E K U D
 K R L H C E Z T A J N V N Z C F C R E Y
 O D E D X R N J P L T A U W F W E H D V
 Z A E V R O H X I Y H P O H N D S N H D
 I N T V P P T Z R R Q Q R F D R W Y H X
 G A S L E A H C T A P T G E E M R E A J
 I V A A F R G E R T F O M T O M W R C J
 R W F R I I U L I U E O A N I A R P R R
 F A J E L T O E M B X W H W I C N M C C
 G K L M D Y R A Y I I L T O G A V A Y Y
 U H Z E L M D B U R I C C K S M T L C W
 R W Q H I Y R A U T S E P N O O G A L O
 U K X P W B D D F G A H F B S U L E E T
 T V K E D M Y D G N X W V P R H U K W U

STEELHEAD
 ITEROPARITY
 ESTUARY
 PAVEMENT
 ANADROMOUS
 SPAWNING
 WILDLIFE

WATERSHED
 GROUNDWATER
 HEALTH
 RAIN
 EPHEMERAL
 REDD
 RIPARIAN

TRIBUTARY
 LAGOON
 AGRICULTURE
 CYCLE
 DROUGHT
 OCEAN
 LAMPREY

Word Search Created by: Melanie McMillan

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What is an interesting fact about yourself?

I taught English in China before WSP for a year and I was far out in western China in the desert province. I was teaching many high school and middle school students. It was a pretty funny teaching experience because I came with no experience as a teacher and was thrown in. Living in a new culture for a year was broadening and definitely had some similarities to working with the Yurok Tribe.

I have two Master's degrees – "you know, it's a hobby! Some people collect stamps, I collect Master's degrees!" Before WSP, I obtained a Master's in Earth and Planetary Science. I was going to do physics but I wanted to play outside more so I settled on a second Master's degree of Geophysics.

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program on our website:
[ccc.ca.gov/watershed-stewards-
program/](http://ccc.ca.gov/watershed-stewards-program/)

Our Mission

The Watershed Stewards Program's (WSP) mission is to conserve, restore, and enhance anadromous watersheds for future generations by linking education with high quality scientific practices.

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